PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year) 09 July 2001 (09.07.01)	
International application No. PCT/GB00/03735	**Applicant's or agent's file reference** P44250/DJF
International filing date (day/month/year) 29 September 2000 (29.09.00)	**Priority date** (day/month/year) 06 October 1999 (06.10.99)
Applicant LLOYD, Gareth	

1. The designated Office is hereby notified of its election made:

   [X] in the demand filed with the International Preliminary Examining Authority on:
   04 May 2001 (04.05.01)

   [ ] in a notice effecting later election filed with the International Bureau on:
   _____

2. The election [X] was

   [ ] was not

   made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Juan Cruz
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

GB0003735

Form PCT/IB/331 (July 1992)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
P44250/DJF		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 00/03735	29/09/2000	06/10/1999
Applicant		
LLOYD, Gareth		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

   [ ] as suggested by the applicant.

   [X] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/03735

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G03B21/26 G09B27/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G03B G09B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 11 00 322 B (PHILIPS NV) 13 February 1959 (1959-02-13)	1-3,5,6, 8-10
A	column 10, line 14-47	4,7,13

X	GB 1 536 278 A (DECCA LTD) 20 December 1978 (1978-12-20)	1,2,5-8, 10
A	the whole document	4,13

X	US 3 832 050 A (JOHANNSEN H) 27 August 1974 (1974-08-27)	1,2,5, 8-10
A	the whole document	13

X	DE 703 644 C (CARL ZEISS JENA) 13 March 1941 (1941-03-13)	1-3,8
A	the whole document	13

	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 April 2001	02/05/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	van der Linden, J.E.

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/03735

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 43 26 260 C (ZEISS CARL JENA) 15 September 1994 (1994-09-15) the whole document	1-3,5-7, 13,14, 16,17
A	US 3 445 159 A (HOPPMANN K) 20 May 1969 (1969-05-20) the whole document	1-4,8
A	US 4 192 584 A (DOUGHERTY W) 11 March 1980 (1980-03-11) the whole document	1,13

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 00/03735

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
DE 1100322	B		NONE		
GB 1536278	A	20-12-1978	NONE		
US 3832050	A	27-08-1974	DE	2106602 A	24-08-1972
			CA	953550 A	27-08-1974
			CH	534895 A	15-03-1973
			DD	96593 A	20-03-1973
			IT	949349 B	11-06-1973
DE 703644	C		NONE		
DE 4326260	C	15-09-1994	NONE		
US 3445159	A	20-05-1969	NONE		
US 4192584	A	11-03-1980	NONE		

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
P500025PCT/DJF		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/03735	29/09/2000	06/10/1999
International Patent Classification (IPC) or national classification and IPC G09B27/00		
Applicant LLOYD, Gareth		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
04/05/2001	06.12.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Simonini, S Telephone No. +49 89 2399 8575

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03735

I. Basis of the r port

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-8	as originally filed				

Claims, No.:

1-18	as received on	07/11/2001	with letter of	05/11/2001	

Drawings, sheets:

1/4-4/4	as originally filed				

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   - ☐ the description, pages:
   - ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 17,18.

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 17,18 are so unclear that no meaningful opinion could be formed (*specify*):
see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such stat ment

1. Statement

Novelty (N) Yes: Claims 1-16

	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-16
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-16
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

Re It m III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claims 17 and 18 are excluded from examination because they contain references to the drawings (Rule 6.2a and Guidelines Section IV, III-4.10)

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive st p or industrial applicability; citations and explanations supporting such statem nt

1 Reference is made to the following document:

D1: DE 11 00 322 B (PHILIPS NV) 13 February 1959 (1959-02-13)

2 **Claim 1** is considered as involving an inventive step (Art.33(3) PCT) for the following reasons. Document D1 represents the closest state of the art to the subject matter of claim 1.
The fact that the lens can be moved between two positions solves the problem of providing access to the slides. This solution is not suggested by any of the available prior art.

3 **Claims 2 to 16**, dependent on claim 1, also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VII

Certain defects in the international application

1 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

2 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in document D1 is not mentioned in the description, nor is this document identified therein.

3 Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
12 April 2001 (12.04.2001)

PCT

(10) International Publication Number
WO 01/26077 A2

(51) International Patent Classification[7]: G09B 27/00

(21) International Application Number: PCT/GB00/03735

(22) International Filing Date:
29 September 2000 (29.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
9923646.5 6 October 1999 (06.10.1999) GB

(71) Applicant and
(72) Inventor: LLOYD, Gareth [GB/GB]; 61 North End, Ditchling, East Sussex BN6 8TE (GB).

(74) Agents: PRATT, David, Martin et al.; Withers & Rogers, Goldings House, 2 Hays Lane, London SE1 2HW (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *Without international search report and to be republished upon receipt of that report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 01/26077 A2

(54) Title: A SLIDE PROJECTOR

(57) Abstract: A slide projector that is portable, easy to use and suitable for use by an individual, or individuals in the home. The slide projector comprises means in which to project an image perpendicularly from a slide onto a projection surface. In use, the projected image of the slide lies in a substantially planar surface. The slide is located in a rotating carousel which can be automatically, or manually rotated, thus providing accurate simulation of the orientation of stars and other celestial bodies at a specific date and time.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(10) International Publication Number
WO 01/26077 A2

(43) International Publication Date
12 April 2001 (12.04.2001)

PCT

(51) International Patent Classification[7]: G09B 27/00

(21) International Application Number: PCT/GB00/03735

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(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
9923646.5 6 October 1999 (06.10.1999) GB

(71) Applicant and
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(74) Agents: PRATT, David, Martin et al.; Withers & Rogers, Goldings House, 2 Hays Lane, London SE1 2HW (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *Without international search report and to be republished upon receipt of that report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 01/26077 A2

(54) Title: A SLIDE PROJECTOR

(57) Abstract: A slide projector that is portable, easy to use and suitable for use by an individual, or individuals in the home. The slide projector comprises means in which to project an image perpendicularly from a slide onto a projection surface. In use, the projected image of the slide lies in a substantially planar surface. The slide is located in a rotating carousel which can be automatically, or manually rotated, thus providing accurate simulation of the orientation of stars and other celestial bodies at a specific date and time.

A Slide Projector

The present invention relates to a slide projector, and more specifically to a portable planetarium projector for use in the home.

As we move into the next Millenium, there is an increase in the already high interest in the scientific study of astronomy, and also in astrology. Many people visit exhibitions and shows which demonstrate, in simple terms, the movements of stars and other celestial bodies during an hour, day, month or year. Such demonstrations are usually held in large areas and in front of large audiences, due to the complexity and cost of the planetarium required in order to demonstrate the astronomy as accurately as possible.

A planetarium has, by dictionary definition, a projector that projects the positions and movements of stars and planets on to a hemispherical domed ceiling in order to simulate the night sky to an audience seated below. Although this definition stipulates a the presence of a hemispherical domed ceiling, a planetarium, for the purposes of this specification, should be interpreted to include a substantially planar display surface.

Hereto, all mechanical planetarium projectors use spherical or hemispherical surfaces on which a star field representation is held before being projected onto a dome shaped surface. A computer-based planetarium projector is known, which has a star field projected from a flat computer screen, as described for example in UK Patent No. 2050775. The software is, however, written for the projection of the star field image onto a domed surface.

The problem with all current planetarium projectors is that purpose-built domed auditoria must be built in order to accurately display the night sky, with the all the celestial bodies in their correct orientations and positions.

Temporary domed structures, such as large inflatable domes, of about 3.5 to 4.5 meters diameter, can be filled with air to demonstrate astronomy, although experts are required

to run the demonstration, and the costs can be as large as £10,000. Such planetariums are more suitable for hiring by schools to demonstrate simple astronomy to their pupils.

A children's toy is currently available that comprises a bulb within a transparent ball that may provide some sort of night sky display, when projected on to an outside surface. This is very much limited to being a toy, however, and does not provide an accurate projection for the purposes of studying astronomy.

A conventional planetarium projector comprises a spherical body located around a central light source. The spherical body has an array of pinholes in its surface, through which light is projected from the internal light source. The pinholes do not have any lens assembly. This leads to a projection of dim and fuzzy star, and celestial body, representations.

Furthermore, conventional planetarium projectors require a great deal of skill and training to be operated effectively.

There are currently no accurate planetarium projectors available that are suitable for use by an individual in the home, due to the size, complexity and cost of planetarium projectors, and the requirement for a large domed surface on which to project the star field.

The present invention seeks to alleviate the aforementioned disadvantages by providing a slide projector that is portable, easy to use, of reasonable cost, and is suitable for use by an individual, or individuals, in the home. In particular, the present invention eliminates the necessity for a domed surface on which to project the night sky in the case of planetarium projector.

Accordingly, there is provided, a slide projector comprising projection means for directly projecting an image from a slide perpendicularly onto a projection surface, the projection means being such that the projected image of the slide lies, in use, in a

substantially planar projection surface, the projection means comprising a light source and at least two vertically juxtaposed slides, parallel to each other.

Preferably, images are projected vertically from the slide onto a substantially planar projection surface and the slides are in the horizontal plane.

In a preferred embodiment, the slide projector comprises two vertically-juxtaposed slides, parallel to one another in the horizontal plane.

Preferably, one of the slides is rotatable while the other slide remains in a fixed position. Alternatively, both slides may be rotatable or both slides may remain in fixed positions.

The slide projector may also have means for retaining the slides in a set position, preferably by providing an air flow above and below the slides. Preferably, the slides are retained due to a sub-atmospheric pressure that is formed below the slides.

Preferably, the slide will display images of astronomy such as starfields and other celestial bodies

Preferably still, the fixed slide is one that, in use, displays an image of the sky's horizon. The rotatable slide is preferably one that, in use, displays the image of night sky showing a starfield and/or various other celestial bodies.

A planetarium projector constructed in accordance with the present invention will now be described in detail, by way of example, with reference to the accompanying drawings, in which :

Figure 1 is a perspective view of the planetarium projector, when in its closed position;

Figure 2 is a perspective view of the planetarium projector, when in its open position;

Figure 3 is cross sectional view taken through A-A of Figures 1 or 2; and

Figure 4 is a diagrammatic representation showing the internal components of the planetarium projector of Figures 1 to 3.

Referring to Figure 1, the planetarium projector comprises a hollow hemispherical lower portion 1 and a hollow hemispherical upper portion 3. Preferably, the portions are made from plastics material. The lower portion 1 is mounted on a base 5, in the form of a ring, which is able to receive the lower portion, such that the lower portion can be positioned stably thereon and is able to be oriented through a limited angle range. The lower portion 1 may be provided with several indentations with which to receive the upper edge portion of the base 5, to achieve better stability.

The upper portion 3 is formed in first and second hemispherical parts 7 and 9. The first part 7 is fixedly attached to the inner wall of the second part 9, and protrudes downwards therefrom. The upper hemispherical portion 3 is pivotally mounted on the lower portion 1 such that the first part 7 is slidable within the lower portion.

The upper portion 3, therefore, can be retained in an open position, as shown in Figure 2, wherein the first part 7 of the upper portion is slid into the lower hemispherical portion 1 such that a bottom rim 14 of the second part 9 abuts an upper rim 13 of the lower portion 1. When the upper portion 3 is in its opened position, the interior of the planetarium projector is easily accessible.

Alternatively, the upper portion 3 can be retained in a closed position, as shown in Figure 1, wherein the first part 7 of the upper portion 3 is not slid into the lower portion 1, such that the two parts 7, 9 form a hemisphere mounted over, and covering, the lower hemispherical portion 1. At this point, a rim 11 of the first part 7 abuts the upper rim 13 of the lower portion 1.

The upper portion 3 has a large aperture 15 through which light can be transmitted from a light source within the planetarium, and images can be subsequently projected on a

surface. The lower and upper portions 1, 3 of the planetarium are attached together to form a hollow sphere.

In an alternative embodiment (not shown), the upper portion 3 is formed in first and second parts 7 and 9. The first part 7 is fixedly attached to an inner wall of one side of the lower portion 1 and protrudes upwards therefrom. The second part 9, forming a substantial part of the entire hemispherical upper portion 3, is pivotally mounted on the lower portion 1 so as to slidable over the first part 7.

All the components of the projector are located within the hollow sphere. Referring to Figure 4, a plastic base plate 17, having a diameter substantially equal to that of the lower hemispherical portion 1, is fixedly attached to the top of that portion. Thus, the base plate 17 divides the upper and lower hemispherical portions 1, 3.

Referring to Figures 3 and 4, the base plate 17 has, mounted thereon, means for mounting two vertically-juxtaposed transparent slides 19, 21. The mounting means include, a rotatable carousel 23, on which the top slide 19 is positioned. The carousel 23 is driven by an electric motor with gearing 25. The bottom slide 21 rests in an indentation formed in the base plate 17. The bottom slide 21 is not rotatable. The carousel 23 rests on a wider indentation in the base plate 17. A rotatable mounting 26 is located within the carousel 23. The rotatable mounting 26 holds the top slide 19. A wide angle projecting lens 27 is mounted above the top slide 19. With the upper portion 3 retained in its opened position, the projecting lens 27 is swung out of the projection path allowing complete and easy accessibility to the slides 19, 21 and their mountings 23, 26.

The bottom, fixed slide displays an image of the horizon. The top, rotatable slide 19 can be routinely changed and can display, for example, an unannotated night sky or an annotated night sky showing northern or southern hemisphere starfields, planets and other celestial bodies associated therewith or solar systems and celestial bodies associated therewith.

A light source, in the form of a standard low energy halogen reflector bulb 29, is located beneath the bottom slide 21. A condensing lens 31 is located between the bulb 29 and the bottom slide 21 so as to condense and intensify the light emitted to the bottom slide. The condensing lens 31 is fixed to a support plate 35 made of plastics material. The support plate 35 is attached to the base plate 17. The support plate 35 additionally functions as a ventilation baffle to provide thorough ventilation to both the bottom slide 21 and the condensing lens 31. An aperture 54 is provided in the lower hemispherical portion 1, the aperture forming an air inlet to provide air flow underneath the bottom slide 21, so as to keep the bottom slide sufficiently cool.

The light source 29 is fixed to a support plate 41, made of a metallic material which is able to withstand high levels of heat, such as tin, for example. The support plate 41 is coated with non-flammable black paint. A further support plate 43, with a heat filter 45 attached thereto, is provided above the light bulb support plate 41. The support plates 41, 43 are attached to the base plate 17. The heat filter 45 is positioned directly above the light bulb 29 to reduce the intensity of the heat transmitted from the light bulb to the condensing lens 31. An aperture 47 is provided in the lower hemispherical portion 1 between the two support plates 41, 43, and forms an air inlet to provide air flow over the light bulb 29 in order to carry away heat emitted from it. The support plates 41, 43 additionally function as ventilation baffles.

The projecting lens 27 is located within a mount 28 adjustably mounted on the lens plate 15, and protruding upwardly therefrom. The projecting lens 27 is positioned such that images on the transparent slides 19, 21 can be projected onto a display surface (not shown). The exterior of the projecting lens mount 28 has a screw thread which engages with a horizontal aperture in the lens plate 15 attached to the upper hemisphere portion. The projector operator is able to rotate the lens mount 28 to move the lens 27 vertically in order to achieve focusing of the image on the projection surface.

A transformer 51, within the projector sphere, provides low voltage to the light bulb 29, the motor 25 and a fan 53, from a mains supply. The transformer 51 additionally provides ballast weight to keep the hollow sphere stable and upright on the base ring 5.

One or more further cooling fans are provided within the planetarium sphere in order to keep the components within the sphere sufficiently cool. An aperture 55 is provided in the surface of the upper portion 3, which allows the warmed air to exit the sphere. The ventilation fan(s) 53 cause sub-atmospheric air pressure to develop in the lower hemispherical portion 1. This, in turn, causes the higher air pressure, formed in the upper hemispherical portion 3, to gently push down on the slide 19. The resultant force firmly seats the slide 19 in its position, and prevents it from moving vertically, thus avoiding the re-focusing operations usually necessary with conventional slide projectors.

Referring back to Figure 3, the base plate 17 has a ball compass 59 formed integral therewith. This allows the projector to be correctly aligned with magnetic north, such that the projected night sky can accurately reflect the orientation of the stars for the current date and time. The carousel 23 is circular and has, circumventing its perimeter, a time dial 61. In use, the top slide 19 rests in a mount 26 that rotates within the carousel 23, and is initially aligned to the correct date using the time dial 61. The time dial 61 is then aligned, together with the slide mount 26, to the correct time with the aid of an arrow marked on the base plate 17. Once positioned correctly, the top slide 19 rotates together with the carousel 23 at a predetermined speed, set by a carousel speed control 63 formed integrally with the base plate 17. As the top slide 19 rotates, above the fixed bottom slide 21, varying images will be emitted from the slides and on to a planar surface (not shown).

An audio tape, compact disc or the like may also be provided to provide narration as the planetarium is in operation.

Due to the nature of the invention, models of varying complexity can be envisaged for different applications. Two examples of such models are detailed below.

A "Junior" model has been produced, having a reduced number of components resulting in reduced price and function. Such a model may be suitable as a child's toy or for soothing illumination of a ceiling of a room in the home. The images of stars and

the like, projected onto a ceiling may also be used as a stencil for correctly placing phosphorescent glow-in-the-dark stars available from toy shops. This model is, preferably, battery powered with a low-wattage lamp. The lenses are preferably made from plastics material. The model does not require a motor or gearing (although the carousel and slide mount will still be rotatable manually) or a ventilation fan.

A "Professional" model has also been constructed which is intended to be used by teachers, and people putting on shows for larger audiences. The control mechanisms of this model are, preferably, operated from buttons exterior to the main planetarium structure by a remote control unit. A relay box in the control unit has a plurality of relays, each being operatively associated with a button to actuate a planetarium mechanism. The carousel 23 also has additional speed settings (for example two minute full rotation) and a switch to rotate the carouselin both directions. Carousel speeds may be selected from the remote control unit. Preferably, this model also has the facility for the operator to remotely change slides. In this case, a plurality of rotatable carousels 23 may be provided on the base plate 17. The base plate 17 may rotate on bearings, thereby bringing each carousel, in turn, into the path of the projected light.

Furthermore, the Professional model, preferably, includes the facility for inaudible ultrasound pulses recorded in an audio program designed to run concurrently with the planetarium to automatically operate the controls of the planetarium.

Although the specific description relates to a planetarium projector, it is clearly envisaged that the invention can be incorporated into any slide projector presentation to show, for example, movements of various items in relation to a fixed horizon or background.

Claims

1. A slide projector comprising projection means for directly projecting an image from a slide perpendicularly onto a projection surface, the projection means being such that the projected image of the slide lies, in use, in a substantially planar projection surface, the projection means comprising a light source and at least two vertically juxtaposed slides, parallel to each other.

2. A slide projector according to claim 1, wherein the image is projected vertically from the slide onto a substantially planar projection surface.

3. A slide projector according to claim 1 or claim 2, wherein the at least two slides are in the horizontal plane.

4. A slide projector according to claim 3, further comprising a projecting lens movable between a first position, directly above the at least two slides, and a second position away from the first position, thereby to allow easy access to the slides.

5. A slide projector according to any one of claims 1 to 4, wherein the projector means comprises rotation means for rotating at least one of the slides.

6. A slide projector according to claim 5, wherein the rotation means is in the form of a rotatable carousel.

7. A slide projector according to claim 6, wherein the rotatable carousel is able to rotate the slide at a predetermined speed.

8. A slide projector according any one of claims 1 to 7, wherein the projection means further comprises mounting means for holding at least one of the slides in a fixed position.

9. A slide projector according to claim 8, wherein the fixed slide is positioned directly below the rotatable slide.

10. A slide projector according to claim 9, wherein the projection means further comprises means for retaining the slides on the carousel and the mounting means respectively, and for keeping the slides in close contact therewith.

11. A slide projector according to claim 10, wherein the retaining means further comprises means for providing of an air flow above and below the slides.

12. A slide projector according to claim 11, wherein the air flow providing means is such as to provide a sub-atmospheric pressure below the slides, thereby retaining them in their respective position.

13. A planetarium having a slide projector constructed in accordance with any one of the preceding claims.

14. A planetarium according to claim 13 when appendant to claim 8, wherein the fixed slide is such as to display, in use, an image of a night horizon.

15. A planetarium according to either of claims 13 and claim 14 when appendant to claim 4, wherein the rotatable slide is such as to display, in use, an image of a starfield.

16. A planetarium according to claim 13 or claim 14, wherein the rotatable slide is such as to display, in use, an image of a planet and any celestial bodies associated therewith.

17. A planetarium according to claim 13 or claim 14, wherein the rotatable slide is such as to display, in use, an image of a solar system and any celestial bodies associated therewith.

18. A slide projector as substantially hereinbefore described and illustrated by the accompanying Figures.

19. A planetarium as substantially hereinbefore described and illustrated by the accompanying Figures.

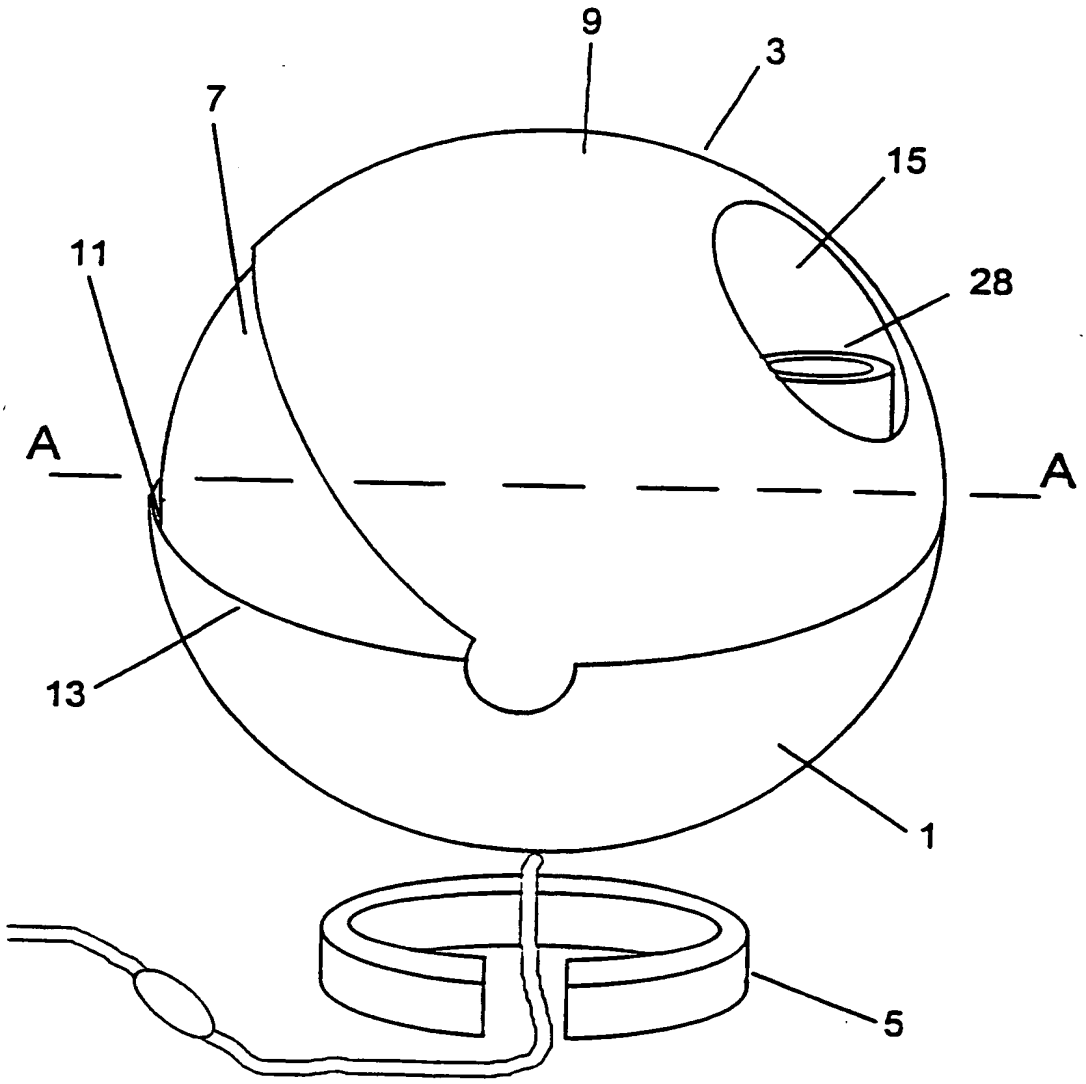

Figure 1

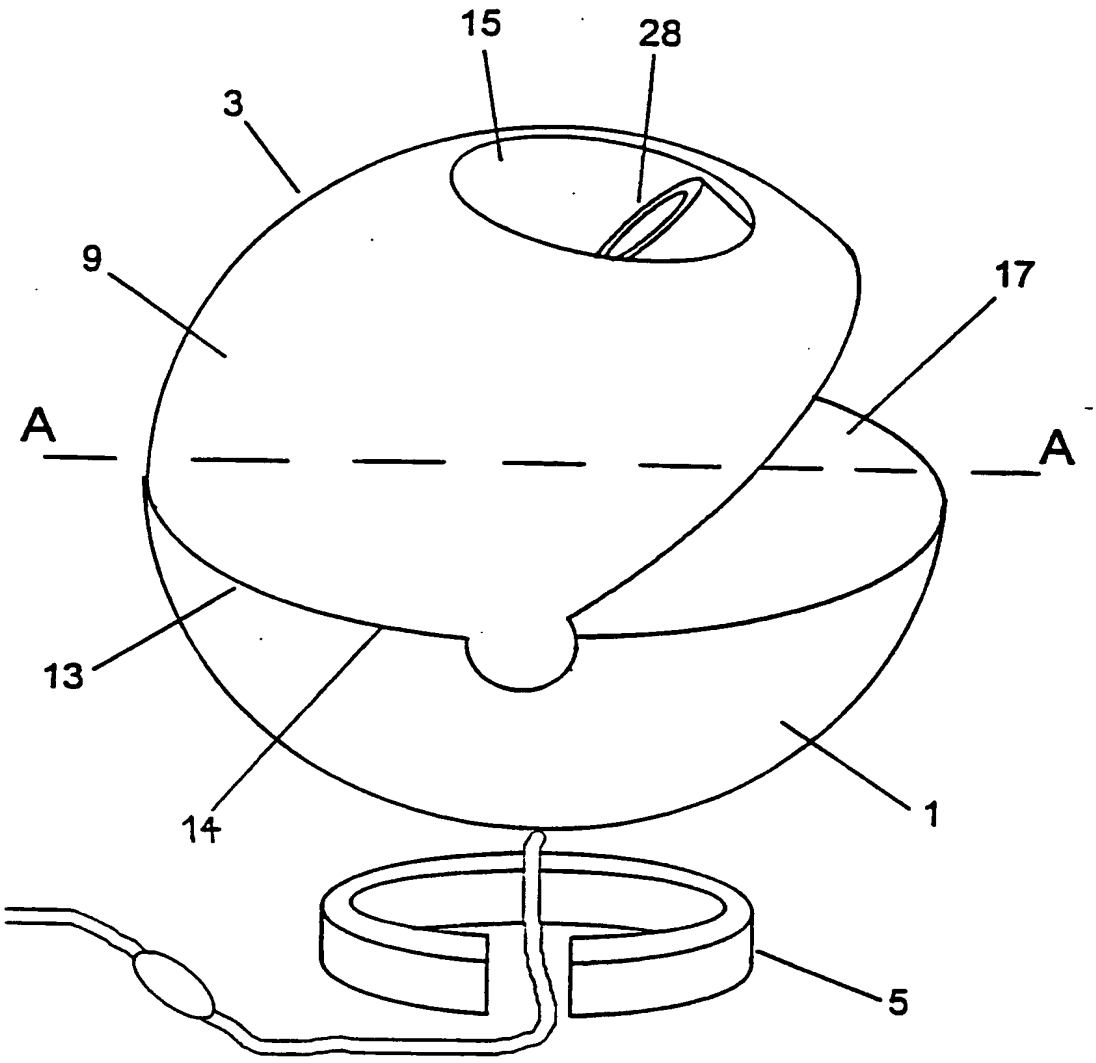

Figure 2

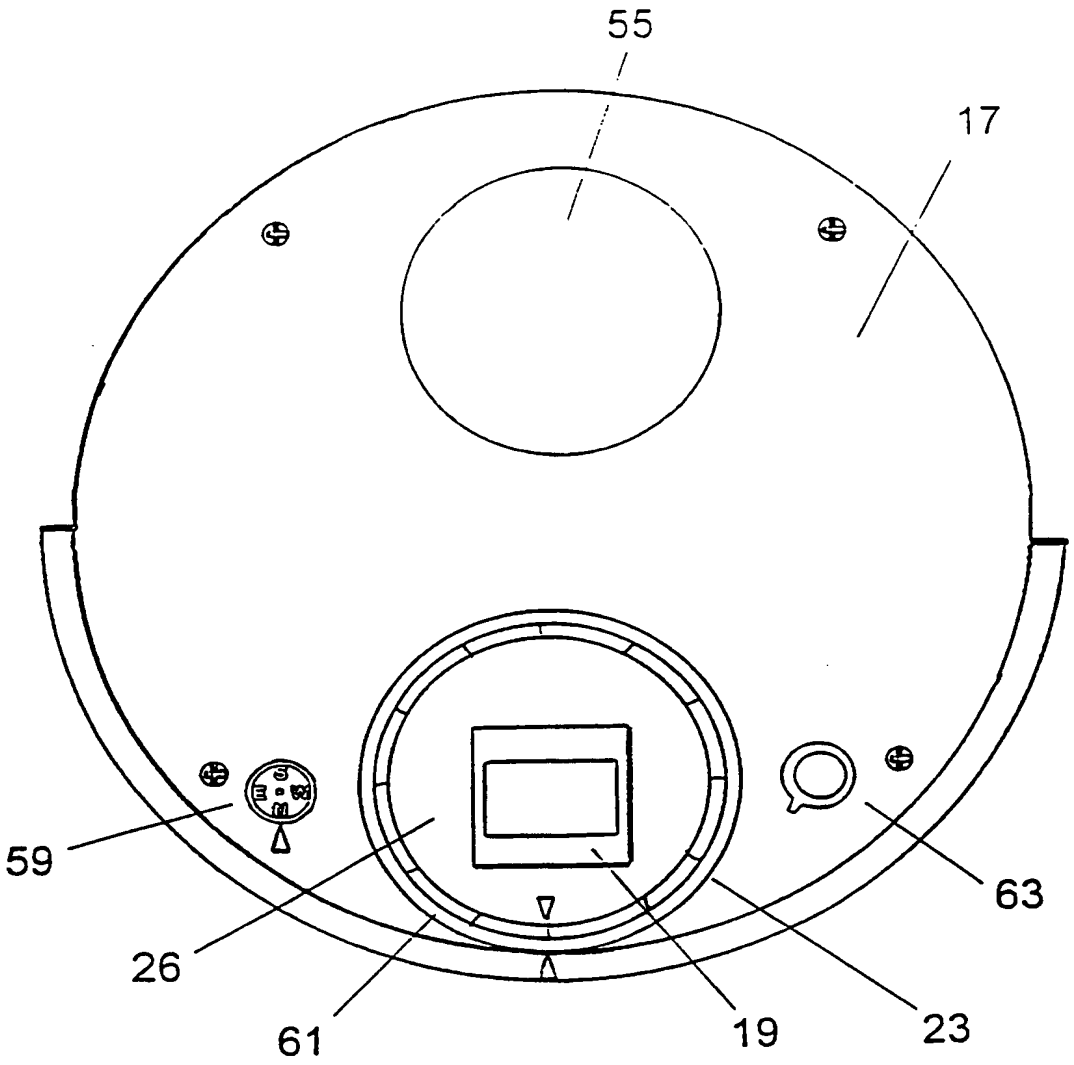

Figure 3

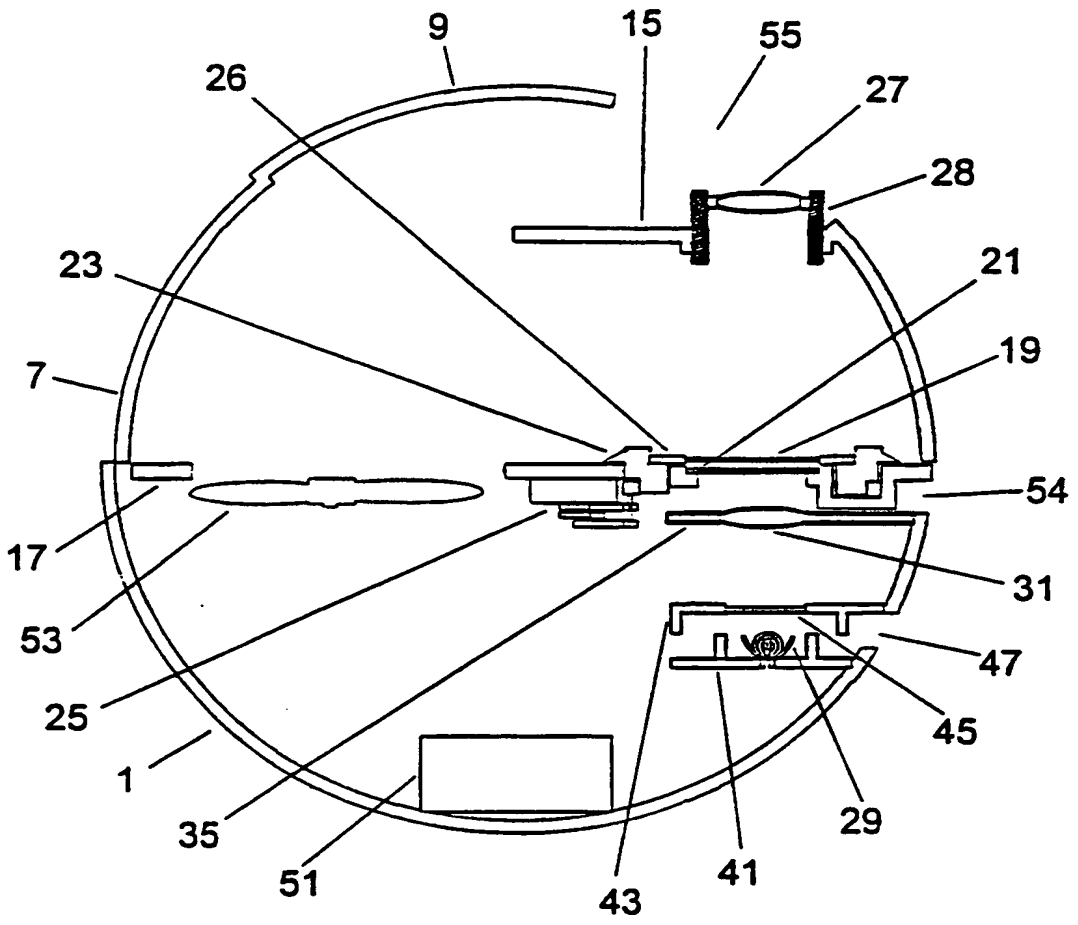

Figure 4